REPORTS

OF THE

MINES AND PROPERTIES

OF THE

Logan County

MINING & MANUFACTURING COMPANY,

OF VIRGINIA.

CAPITAL $1,000,000.

B. F. WEYMOUTH,

SECRETARY.

OFFICE: No. 30 PINE STREET, NEW YORK.

———o———

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REPORT.

To the President and Directors of the Logan County Mining and Manufacturing Company of Virginia.

GENTLEMEN:—

Agreeably to your instructions, I have made, in company with my two assistants, Messrs. Schemorle and Leppier, a general survey of the lands belonging to your Company in the western part of the State of Virginia, and beg leave to submit the following Report as the result of our joint labors.

The lands of the Company embrace one hundred and one thousand acres, and are situated near Logan Court House, Logan County, Virginia, and on the Guyandotte river. On this account, as well as on account of their close proximity to the Tug Fork of the Big Sandy river, another navigable stream, and the James River and Kanawha Canal, they are eligibly situated for the transportation of their products to either an eastern or western market. The agricultural character of the lands, together with the advantages they possess as a manufacturing centre, will be treated of at the concluding portion of the report.

COAL.

In presenting the Report relating to the Geological features of the region embraced by your lands, I shall make no refer-

ence to the successive stages through which it has passed in acquiring, in chronological order, its present complicated structure, but simply offer a systematic description of the geological features as I found them, so as to present the results of my explorations in such form as to make them intelligible to those not thoroughly versed in the Geologist's art.

Soon after making a series of exposures over the tract of the Company, and examining those already existing, I found, from the remarkable expansion and diversified character assumed by several formations, that it was situated within the margin of the great coal field, whose belts or measures traverse this portion of Virginia, and extend through the coal regions constituting the north-west section of the coal deposits. Assuming as a general rule, that explorations in pursuit of coal should be directed to a series of strata, lying in geological position, and that where the out-crop or margin of the conglomerate may be clearly traced, we are to be governed by the direction in which the strata dip, in selecting the line most suitable for examinations, I took my departure from the margin of the basin marked out by the beds of conglomerate, and travelled in the direction of the dip, or towards the north-west, entering slightly upon the upper coal bearing strata, and thus successively encountered the coal seams and their accompanying rocks in the order of their superorition.

In the whole of the north-west portion of this region, the rocks are chiefly of a decidedly silicious character, consisting of sand-stone of various textures, from the finest grit to the coarsest conglomerate, generally containing a considerable amount of mica. Associated with these are layers of lime-stone. Numerous beds of slate also occur, of the character with which coal seams are usually associated, and in and adjoining them, as well as contiguous to the layer of lime-stone, are bands of iron ore. Near the highest strata of the formations north of your tracts, little or no coal is met with, but among the beds next beneath, occur several coal seams of great value, as well on account of the usually good quality, as the abundance and continuity of the coal.

Having thus acquired an accurate acquaintance with the general rocky strata, with their included coal seams and other deposits, we proceeded to trace the several beds composing the upper and lower series of the tract, with a view of identifying particular seams, and, at the same time, the bands of iron ore and lime-stone accompanying the coal. As followed in a south-west direction, these beds exhibit a small amount of slaty strata, though fortunately unaccompanied by any diminution in the thickness, or deterioration in the quality of the coal seams so admirably exposed for long distances continuously in the Guyandotte river hills, whence it can be expeditiously shipped. As the explorations of these beds were continued into the richest part of the coal measures lying towards the southern portion of the Company's tract, the quantity of coal was found to be enormously great, a most striking constancy being remarked in the position, quality and compactness of that portion of the deposits. At almost every point where we examined, the stratum appears in a slightly undulating band, rising and extending in an irregular direction to the west, without in the least, becoming impaired of its richness. From the peculiar uniformity of position and character of these beds, I have no doubt that a general expansion of them would be found spreading themselves away from the most westerly point at which we examined them, still further westward beneath the more elevated section of the Company's tract, in which no openings have yet been made. I cannot, however, leave this topic without suggesting the expediency of making openings in various places throughout the western part.

In order to clearly demonstrate the exact character of the coal deposits on the lands, I will describe two broad undulations or axis. The first, or most eastern, comes from toward Boone County, the strata changing in its course from the north-west dip to the horizontal, and then rising as they extend west so as to present a southeast dip. The whole seam, five feet thick, is roofed in by a thin band of bluish shales. The coal throughout its entire course is black and lustrous, and the overlying shales very fossiliferious. Then follows the main seam of coal, 8 feet thick

at some portions. Resting upon this is a bed of yellow argillaceous and sandy clay, of good quality to make brick, and upon this reposes the vegetable mould which gives to these bottoms their well-known fertility, and which, including the substratum clay, is 22 feet thick.

The second is compact bituminous coal, and is by far the most important seam of the whole series in this section. This seam varies in thickness from four to seven feet, at the Guyandotte river it yields nine feet of coal, including one band of black bituminous shale. We traced it a considerable distance. The coal rests upon a slaty argillaceous sandstone, crowded with fragments of coal plates. This stratum varies from two to three feet. The upper portion of the stratum is very fine fire clay. Many of the other seams in this locality repose upon a dark colored carbonaceous shale or slate, with oblique vegetable impressions. Great diversity is observed in the quality of the second seam of coal at the different openings, but at its worst portions it is equal to the medium standard. By careful tracings, conducted in Pennsylvania and Virginia, these seams, extensively exposed in the valley of the Monongalia, from a point some distance above Clarksburg to the State line, have been shown to be identical with that which is so largely developed in the north part of the same valley, in its prolongation in Virginia, and which is disclosed so extensively in the neighbourhood of Pittsburg. It has been further proved, that continuing towards the west, this seam coming to view on the Ohio river, constitutes the main coal stratum displayed in the hills at Wheeling and for many miles below, and that still further down the river it forms the bed on the Virginia side; while prolonged in a south-west direction from the upper part of the Monongalia valley, it crosses and displays itself over the section in which the Company's tract is situated.

Professor Rogers, in speaking of the coal embraced in this region in his official report, says :—" Making all allowances for the fluctuations in particular strata, it is well calculated to show, in a striking point, the ample natural resources of this highly favored portion of our State." And again,—" Considered in

regard to its thickness and the quality of its coal, as well as the extensive area over which it is found, and the facility with which it can be mined and conveyed to market, this is unquestionably the most valuable of the coal measures, either in Pennsylvania or Virginia." *

In addition to the seams before mentioned, the coal measures of the basin extend to more elevated portions of the tract, situated at the north-western part, and judging from the outcrop of one of the upper seams, it includes about three feet of good coal. Still lower down the hill, and geologically underneath the upper seam, the calcerous band is exposed, associated with iron ore. The lower seam shows itself for a short distance, presenting a thickness of about two feet On the eastern side of rather a bold hill we met with a calcerous band, and at a higher level the overlying coal seam. Above the coal, and forming the upper part of the hill, is a considerable thickness of shales or slates. The fact that other portions showed a variety of that dark color and carbonaceous character indicative of underlying seams, convinced us that the lands of the Company were enriched by Nature with that valuable of mineral treasure to such an eminent degree as to make it almost inexhaustable.

Our analysis of a series of samples of coal taken from a corresponding number of the portions of the same, is as follows :

No. 1.—Coal from near Guyandotte river, composed of alternately black laminæ. In the 100 grains contains,

Carbon,	80.24
Volatile matter,	17.48
Ashes,	2.28
	100.00

No. 2.—Coal from same locality, aspect same as foregoing

Carbon,	77.64
Volatile matter,	17.36
Ashes,	5.00
	100.00

* State Geological Report, 1840, pages 86 to 93, by Prof. W. B. Rogers.

No. 3.—Coal from a more western locality—deep black, shining and compact.

Carbon,	83.36
Volatile matter,	13.28
Ashes,	3.36
	100.00

No. 4.—Coal from a somewhat higher point—compact, fracture irregular, jet black.

Carbon,	76.84
Volatile matter,	17.13
Ashes,	6.03
	100.00

No. 5.—Coal from still higher up toward the northwest portion of tract.

Carbon,	74.55
Volatile matter,	21.13
Ashes,	4.32
	100.00

No. 6.—Coal from a point east of the foregoing.

Carbon,	74.43
Volatile matter,	19.64
Ashes,	5.93
	100.00

IRON ORE.

The first theoretical inference, naturally suggested by the remarkable manner in which many of the veins of iron ore occur on the tract, is, that the primary strata existed at rather a steep inclination before the intrusion of the veins; and these, occupying as they do a corresponding position in relation to the neighbouring strata, is another argument lending probability to the notion that their origin was subsequent to the formation and upheaving of the gneiss. Many of the veins are divided here and there by thin beds of thin rock, into several parallel branches, so that the aggregate thickness of the ore

could not be determined. The adjoining strata are, however, considerably disordered, and the veins are in consequence thrown out of direction by two or three pretty large faults. These are connected with detached or broken off portions, two of which are known to sweep around a curve of almost semicircular form.

On the eastern axis the conglomerate is exposed, the hills being capped by the same in large masses, and slightly exposed in some of the valleys. It is well exposed in the lateral gorges to the westward. On the summit is a narrow denuded valley, not deep enough however to show the shales and sand-stone of this formation, the only rock laid bare being the black slates.

The upper vein, the most uniform in thickness, varies from four to six feet, and having but a slight covering of shale, has been less protected than the lower bands from the atmosphere. It is therefore in a decomposed state, the whole bed sometimes presenting the appearance of a friable shaly oxide, much valued on account of the ease with which it works. Occasionally it occurs in nodules merely incrusted with the oxide. In this connection I will take occasion to mention that it deserves the attention of those engaged in manufacturing iron from the ores, that very frequently the portion of the vein lying immediately beneath the surface, and the fragments and grains of the ores, which often fill the soil in very considerable abundance, are much softer than the ore in the main body of the vein. The action of atmospheric agents upon it, appears to have rendered it more yeilding, and it consequently would, no doubt, mingle more readily in the furnace with the other materials, greatly facilitating the smelting of the mass.

Beneath the upper veins eight or ten feet, is the middle or rock vein, generally eight or ten feet thick. This is a most valuable one, being compact and undecomposed, more uniform than the other vein, and mostly rich and fine grained.

On the western side of the axis another vein rises above the surface, and displays itself boldly at the side of a ravine, running east and west. The lower six or eight feet is of a light gray color, and very pure. Still higher up the lime-stone of the eastern side it is extensively exposed. The ores located in

this immediate vicinity may be considered as occupying two general geological positions—the upper and lower. In the lower part of shales underlying the lowest coal seam, two bands of iron occur, each about a foot in thickness, and separated by about four feet of shales. This ore, from its slight protection, is generally in a decomposed state, consisting chiefly of per-oxide of a loose, scaly texture, and therefore the more easily worked. Below this is a stratum of sand-stone, and beneath this a third bed of ore of about eighteen inches in thickness, and below this occurs a band of lime-stone of a very rich character. As would be expected, these ores are very rich, on account of the filtration and exposure to the atmosphere, to which they are constantly subjected. The upper ores of this group occur above the second seam of coal, and rest upon a lead-colored silicious and argillaceous sand-stone, which being the first rocks of this kind met with above the second seam of coal, may serve as landmarks in searching for ore. This ore is very variable in thickness, usually occuring in large nodules, and fine grained. Like the ores of the lower group, it is explored over a wide area, being found within a short distance of the surface from the base of the gently declining hills at the eastern and western portions of the tracts to their summits.

In referring to the ores in this section, Professor Rogers, in his official report, speaks thus: "The rocks comprehended in this group, with the exception of the shales and slates immediately associated with the coal seams, are for the most part coarse, micaceous sand-stones of a gray and light brownish color; with these are associated the beds of lime-stone, and the most important seams of iron met in the coal measure." *

Annexed is an analysis of two samples of ore taken—the first from a superior vein, and the second from an inferior one —on the tract:

No. 1.—Per-Oxide of Iron, - -	83.00
Alumina, - - - -	3.45
Oxide of Manganese, - -	.25

* Report of Geological Survey, 1840, page 73, by Prof. W. B. Rogers.

Silica and insoluble matter, - -	10.90
Water, - - - -	2.00
Loss, - - - -	.40
Per centum Metallic Iron, 58.10.	100.00
No. 2.—Carb. of iron, - - -	82.55
Alumina - - - -	1.00
Lime—trace, - - -	——
Silica and insoluble matter, -	12.05
Water, - - - -	3.50
Loss, - - - -	.90
Per centum Metallic Iron, 39.85.	100.00

The coal seams and ore veins are freely interspersed with limestone of the richest quality, from which can be procured the flux for the furnace, and from which can be made the finest hydraulic cements.

Concluding Remarks.

Of the lands of the Company considered in respect to their agricultural advantages and manufacturing facilities, I cannot speak too highly. They are of a most excellent quality of alluvial soil, well wooded, with creeks running through them. In their under-growth they are covered with cane, paw-paw and spice wood. The timber with which they abound consist of walnut, ash, mulberry, sugar-tree, black and white oak, and hickory.—The tract is situated in 38° of N. latitude, and therefore in a climate genial and indulgent, being free from the burning heat of summer and the extreme cold of winter. The neighboring land of a similar character is extraordinarily productive, yielding to industrious husbandry most excellent crops. Nor is the surrounding country wanting in the picturesque in natural scenery. Gently declining hills spring from the plains, commanding wide and exhilerating views of the surrounding country, whose numerous valleys, undulating and fertile fields and woods, present at all times most beautiful and diversified scenes. Possessing, as this section of country does, in addition to its mineral wealth, in the

nature of its soil and geographical position, resources exceeded by no other portion of the Great West, I think it must in the course of time become thickly populated and in a corresponding degree prosperous. I think I hazard nothing in the expression of this opinion; for as agriculture forms one of the most important branches of our domestic enterprise, and yields most directly the means of subsistence, this valuable domain, producing so abundantly, must be found by those seeking this most safe and stable species of employment, at once independent and delightful to the man of thrift as well as the man of taste.

There is something in the genius of our people, the spirit of our institutions, or the local circumstances in which we are placed, that direct public enterprise into those channels of effort which refer more particularly to the useful rather than the ornamental, and it is through this that the mechanical industry of our country has wrought its most effective triumphs. Such being the case, is it not natural to suppose that in selecting a field for its development, due regard will be had to the local ability of the section in the production of the materials to fabricate with, and the means of subsistance? In what comparatively unoccupied section of our country is a better locality than in the very valley where your Company's land is situated? It is a mistake to suppose that the destiny of this valley has fixed it down to the almost exclusive pursuits of agriculture, for as a general rule in all ages of the world, and in all countries, the mouths go to the food and not the food to the mouths. The Atlantic States, and particularly New England, claim that they are to become the exclusive seats of the manufactures with which the west is to be supplied; that mechanics and artisans and manufacturers are not to select for their place of business, the points where the means of living are most abundant and their manufactured articles in greatest demand, but the section which is most deficient in those means, and to which their food and fuel must, during their lives, be transported hundreds of miles, and the products of their labor be sent back the same road for a market.

But this claim is neither sanctioned by reason, authority, nor experience. The mere statement exhibits it as unreasonable.

The eastern manufacturing states have already nearly, if not quite, attained to the maximum ratio of excrescent population, and cannot therefore, greatly augment their manufactures without a correspondent increase in agricultural production. This valley then, as I before remarked, must, sooner or later, become the field for the enterprise and labor of the excrescent population of the Eastern States. So far as my observations have extended, I know of no better point of settlement for such labor than the very lands whose survey I have just made, for, in addition to their capacity for prolific agriculture, they possess in a remarkable degree, the natural aids for manufacturing. For example, they have water power equal to all manufacturing exigencies, and inexhaustable beds of the richest coal and iron, as well as timber to make charcoal from, as materials with which to fabricate. Will laborers be wanting? Where food is abundant and cheap there cannot be long a deficiency of laborers. With the possession then of the natural advantages, and facilities of transporting the manufactures to either an eastern or western market through the adjacent rivers, the one navigable to the James River and Kanawha Canal, and the other to the Ohio River, is it not reasonable to suppose that the young, the active, and the enterprising, will ere long be seen pouring into this exuberent valley and marking it with the impress of their victorious industry?

Of the patience, perseverance and ability displayed by my two assistants throughout the entire prosecution of their trying labors, I cannot speak other than in terms of the most unqualified commendation.

Yours, respectfully,

P. D'AVRONVILLE,

New York, June 11, 1859. *Geologist.*

The following letter to the Virginia Land Company, referring in a measure to the lands of this Company, is not deemed out of place here.

LETTER FROM GOVERNOR WISE.

EXECUTIVE DEPARTMENT.

Richmond, Va., Aug. 2, 1856.

DEAR SIR:—

In reply to yours of the 30th ult., I inform you that I am generally acquainted with the lands of Western Virginia. They consist of every variety, and most of them are immensely valuable beyond their present prices. For agriculture, for horticulture, for grazing, for milling, for mining in iron, coal, copper, salt, gypsum, marble, and for manufacturing purposes generally, they will in time, as soon as internal improvements have made them accessible to market, be among the finest lands for human industry to labour upon in the world.

Their locations for health make them our summer resort, and they are abundantly watered by every variety of springs, the most various perhaps upon the same space of earth. I know of no better investment than can be made with care in Virginia Trans-Allegheny lands. But care must be taken both in respect to titles and locations.

Our public and private works are progressing reasonably well, They have already penetrated far, and I can say to all that I expect nowhere a more wonderful and healthful development than I expect to see before ten years in Western Virginia. Bath county is rugged, but she is rich.

Yours, respectfully,

HENRY A. WISE.

The Company have heretofore deemed it impolitic and injurious to the interests of the Stockholders, to force the working of their Mines in Virginia, with that vigor of which they are deserving, until the completion of the James River and Kanawha Canal; but now that that most desirable improvement is rapidly

approaching completion, under the auspices of the French Company which has recently purchased it from the State, every effort will be made to prosecute the working of these Mines. The French Company alluded to, have not only purchased the Canal, but also a vast domain of land in Boone County, the adjoining county to Logan, and will, in a short time, colonize fifty thousand Frenchmen on their lands, to develop their now hidden treasures. This action of the French Company will, of course, benefit the Logan County Mining and Manufacturing Company immensely.

Another reason, operating to retard the action of the Company, was, that considering the vast importance of their hematite Virginia ore beds, and the increasing demand for iron, they hesitated to meet the responsibilities attending the fluctuations of the magnetic ore market, or rather the uncertainty of getting a continued supply of this ore, which is an all essential material to the making of good iron, for puddling purposes, from the iron derived from the hematite iron ore. Virginia being entirely barren of magnetic iron ore, and it becoming daily more scarce, both in this country and Europe, and consequently high, they have long been making efforts to secure a magnetic iron ore property, in which they have at length been successful. At a great outlay, they have secured an inexhaustible bed of magnetic iron ore, known as the Mount Morris Mines of Rockland County, New York, which have been recently surveyed and the ore from them analysed by that eminent Geologist, Professor B. Silliman Jr., of Yale College, whose able report is herewith annexed. This acquisition to their Virginia property, they hold of the utmost importance and advantage, for the following reasons, viz:

First:—The cheapness with which they will now be able to supply themselves with this ore, enabling them to successfully compete with any market in producing iron.

Second:—The certainty of always having a supply; and

Third:—Its desirable location, extent, and superior quality, all of which combined, must, beyond the possibility of a doubt, make it form a great additional revenue to the Company.

This ore bed is located about three and a half miles from Sloatsburg, on the New York and Erie Rail Road, about fifteen miles from Piermont, on the Hudson River, which is the terminus of said road, and about thirty miles from New York City. A tram-road can be built from the opening of the mine to intersect the Erie Rail Road at Sloatsburg, at a small expense, as there is a gradual inclination beside a stream all the way, where but little excavation would be required. The ore can be mined at a cost of not exceeding seventy-five cents per ton. As the bed is located in a mountain or hill about two hundred feet high, and the vein runs its full length, cropping out upon its summit, no shafting, machinery or power for hoisting or pumping will be necessary. All that is essential to reach the ore is to drift or cut leads into the side of the hill, and introduce cars to be loaded with ore into the very heart of the ore bed. From the situation of the ore, it will be readily perceived how the leads free themselves from water without the aid of pumps. With the railroad built three and a half miles, the ore can be delivered on the banks of the Hudson at a cost not to exceed $1.50 per ton, where there is a quick and ready demand for it, at from $4.00 to $4.50 per ton. Thus a large and profitable business can be at once carried on. But this superior ore should be manufactured by the Company on the spot, as the best of coal can be had for working it, at from $2.75 to $3.00 per ton, and iron produced at a cost not to exceed $15.00 to $16.00 per ton, thus showing for the quality of iron that this ore will produce, at present low rates, a profit of from 150 to 200 per cent. Can capital be invested in a more safe or lucrative business? This is not an enterprise situated in California or New Mexico, but one within the reach of every persons investigation.

By order of the Board of Directors,

B. F. WEYMOUTH,

New York, October 19th, 1860. *Secretary.*

REPORT OF PROFESSOR SILLIMAN.

To Judge S. D. Morris, Brooklyn, N. Y.

Dear Sir:—

In company with yourself and Mr. Whitbeck, of New York, I have lately visited and examined the locality of Magnetic Iron Ore, held by you in Rockland County, New York.

Its Situation.

The property held by you and your associates is situated about four miles from Sloatsburg, on the Erie Railroad, towards the Hudson River, from which it is about fifteen miles. The Magnetic ore occurs on a low mountain ridge of, so called, primitive rocks, known in the region as "Black Mine Ridge." This ridge is intermediate between two more extensive and loftier ridges, whose general course is N. E. by S. W. Its height is from 100 to 200 feet above the adjacent valley through which it runs, while the bounding mountains rise probably 200 feet higher than the ore-bearing ridge. It is especially in such intermediate rigdes that magnetic ore occurs.

Mode of Occurrence.

The magnetic ore comes to the surface on your property at a point on the ridge which I shall call "Roger's Knoll." It is not always the case that large and valuable deposits of this ore come to surface. In the absence of the ore itself, the experienced observer in search of magnetic iron is guided in his explorations for its discovery by one or two natural features which are generally esteemed a sufficient warrant for its presence. These are: first, a peculiar rock, known as the "Wall Rock of the Magnetic Ore," and which is always the upper or

hanging wall; and second, the "Black Jack," as the miners distinguish a black, or greenish black hornblende, which is the foot-wall—and not infrequently, the gaugue or vein-stuff accompanying the ore.

The Wall Rock is a hornblendic rock with masses of quartz, (flint-stone,) scattered through it; more or less open in its structure, and stained by iron rust. It is striking in its appearance, and where once seen is easily recognized. I traced this "wall rock" on your property, at intervals over a range of a mile or more on the back of the ridge, both north and south of "Ro ger's Knoll."

The "Black Jack" is the eastern boundary of your veins, and at the surface forms the chief part of the mass—the magnetic iron ore being distributed in it in strings and courses, the largest of which was at its outcrop about 12 to 15 inches wide.

Appearance of the Surface.

Prior to my visit to your property, no explorations had been made, beyond the movement by hammers of the loose pieces of ore on the surface. About 15 inches of the ore appeared in sight, open to the weather. It seemed probable that the wall rock overhung and closed in the outcrop of the vein, and this circumstance rendered it difficult to form any but a conjectural estimate of the probable width of the ore channel. It seemed, however, from the sub-data at hand, likely to measure some 12 to 15 feet.

Exploration of the Vein.

To settle the width of the vein and the abundance of the ore beyond dispute, I advised the opening of the ore channel by a cross cut from wall to wall, at a depth sufficient to pass beneath the overhanging foot-wall. I selected for this purpose a point of ground where the falling away of the eastern slope of the hill opened an easy access to the ore, without much obstruction from overburthen, and where of course the ore could be reached rapidly and with little expense. Your experienced iron master, Mr. Isaac Rodgers, accordingly commenced an opening there at

once, and by his letter of June 4th, and subsequent dates, I learn that he has gone down on the vein to a point where he finds it to measure thirteen feet in width, from wall to wall. The wall rock at this point overhangs about one foot in two and a half feet. There are now three leaders or courses of solid ore traversing the black jack, besides a course of about ten inches in width of sulphuret of iron. It is very fortunate for you that all the sulphur is thus got together in a distinct course, leaving the magnetic iron quite free of that troublesome ingredient.

Professor Mather, in describing this general region in his official report for 1842, speaks thus :—"At some places where a great bed of (this) ore occurs at some depth, only a few small stripes of ore penetrate through the superincumbent mass to the surface, as if the rocks had been cracked upward, and the small seams of ore had been forced up from the main mass below." This language describes very accurately the original appearance of your property, and its general truth seems confirmed by the explorations thus far carried on by Mr. Rogers.

The position of Roger's opening is every way favorable for economical working, and is the place best situated in every respect of any upon your property, for an adit to deliver ore from tram wagons or barrows to carts, as also for drainage.

Composition and Nature of the Ore.

The chemical composition of Magnetic iron ore when quite pure, is

Per-Oxyd of Iron, - - -	68.97
Prot. do. do. - - -	30.03
	100.00

It contains of Metallic Iron, ... 72.40 per ct

But this ore is seldom absolutely pure, and contains usually a few per cent. of foreign matter.

The assay of samples of your ore, collected by myself, gives the content of Metallic Iron - - 65 per cent.

The remaining 7 per cent. is chiefly silica and alumina, with a trace of manganese, but no titanic acid.

The ore is strongly magnetic, or polar. Every lump I examined had well marked poles, and attracted smaller fragments of the ore to itself. Of course it is powerfully attracted by a magnet.

It breaks in octahedral faces, (triangles) and it has a fine black color, the metallic lustre, and a density of 5.

Uses.

This ore is the one from which the best iron and steel in the world is made. Added, even in moderate quantities, to poorer ores, it enables the iron master to produce a high quality of pig-metal. With its own weight of the brown hematites (limonites) of western Massachusetts and Connecticut, it produces at Hudson and Manhattanville iron too well-known in the market to need description. England has drawn her supplies of this ore from Norway and Sweden for many years, and now we are told she is unable to obtain from those countries all that she needs of magnetic iron for her steel industry, and is looking to your region to meet her wants. The clearer ores, and those from the Magnetic Mines of Lake Superior, find their way to tide-water for lining puddling furnaces, for which no material can be named equal to it. Why, then, should you question your ability, so near the great metropolis, to sell any quantity of this ore you may be able to furnish, and at remunerating prices.

Distribution of these Ores in Southern New York.

For over a century past, it is well known, that magnetic-iron ore has been explored and excellent iron made from it in the county of Orange and in the adjoining counties of Putnam and Rockland. The Sterling Mine—so named from Lord Sterling, its first owner—has been worked in Orange on this ore since 1750. The Forrest of Dean, and other well known mines, have furnished to commerce a supply of iron noted always for superior qualities.

Magnetic Iron occurs in these counties always in the primary rocks—meaning gneiss—hornblendic gneiss—and pure hornblende. The bedding or structure of these rocks is in the

main N. E. and S. W. with a slight dip to the south or S. E. The masses of magnetic-iron-ore occur between these beds of gneiss, and in general conform to them.

Whether these magnetic deposits are really beds or veins is a question of no particular importance to discuss here. It is sufficient that you have in this case an ample supply of this very valuable ore.

I have the honor to remain,

Dear Sir, yours, very respectfully,

B. SILLIMAN, JR.,

Professor of General and Applied Chemistry,

Yale College.

New Haven June 14, 1859.